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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09-582,432	06/26/2000	TAKU MI KATSURAO	2000_0719A	4316

7580 05/06/2003
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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 05/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/582,432

Applicant(s)

KATSURAO ET AL

Examiner

Susy N Tsang-Foster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133)
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2 is/are allowed.
- 6) ☒ Claim(s) 1 and 3-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other _____

DETAILED ACTION

Response to Amendment

I. The declaration under 37 CFR 1.132 filed 2/11/2003 is insufficient to overcome the rejection of claims 1, and 3-9 based upon WO 97/18596 as set forth in the last Office action because:

Declarant's results do not provide any evidence that a hexafluoropropylene/vinylidene fluoride copolymer resin having 5% hexafluoropropylene by weight with a molecular weight greater than 500,000 cannot be extruded at 230 °C. The results in the declaration are drawn to PVDF, not to the hexafluoropropylene/vinylidene fluoride copolymer resin that is claimed and disclosed in the WO 97/18596 reference (Equivalent document US 6,284,412 B1 relied upon for translation).

The declarant's estimate that the vinylidene fluoride copolymer extruded at 230 °C into sheets in Example 1 of the reference had molecular weights of 300,000 to 350,000 is speculation that is not supported by relevant data. Since the results presented in the declaration are for the polyvinylidene (PVDF) polymer only and not to the copolymer and the declarant admits that the copolymerization of vinylidene fluoride with hexafluoropropylene has a tendency of lowering the melt viscosity, the declarant's conclusion that only 5 wt% inclusion of hexafluoropropylene with the remainder of vinylidene fluoride in no way allows a substantial increase of molecular weights of the resultant copolymer for extrusion in the reference is unpersuasive. Furthermore, Gozdz et al. (US 5,429,891) disclose that a copolymer of vinylidene fluoride and

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hexafluoropropylene can have a molecular weight ranging from 100×10^3 to about 500×10^3 (col. 5, lines 44-53) and that the copolymer in combination with a plasticizer can be extruded (col. 7, lines 12-47). There are many parameters that affect the extrusion process such as the kind of plasticizer or solvent added to the copolymer composition for extrusion in addition to the temperature.

Nevertheless, the declarant's opinions of the extrusion process is irrelevant since the reference WO 97/18596 (Equivalent document US 6,284,412 B1 relied upon for translation) clearly discloses that the preferred molecular weight of the polymer used in the invention of the reference is 1,000 to 10,000,000 (col. 14, lines 23-25) and that PVDF and copolymers comprising vinylidene fluoride units are especially preferred (col. 13, lines 64-67 and col. 14, lines 1-5). Vinylidene fluoride/hexafluoropropylene (HFP) copolymer is specifically given as an example of a copolymer comprising vinylidene fluoride units (col. 13, lines 45-47). The reference discloses that a hexafluoropropylene/vinyl fluoride copolymer resin contains 5 weight percent HFP (col. 26, lines 55-57) as the invention. Thus the reference also discloses as a whole that the preferred molecular weight of vinylidene fluoride/hexafluoropropylene copolymer having 5 weight percent HFP is 1,000 to 10,000,000.

Figure C of applicants' amendment filed 4/30/2002 shows that the relationship between the intrinsic viscosity and the molecular weight (average molecular weight) of the copolymer of vinylidene fluoride and hexafluoropropylene can be expressed by the equation $y = 34.851x - 9.2093$. When the values of 1,000 to 10,000,000 are substituted for y in this equation, the values of x are in the range of 0.0029 dl/g to 28.7 dl/g which encompasses and anticipates applicants' claimed range of 1.7 dl/g to 7 dl/g.

The art rejections based on WO 98/38687 are withdrawn in view of the certified translation of the priority document submitted on 2/11/2003 which supports the currently claimed subject matter.

Claim 10 has been added. Claims 1, and 3-10 are pending. Claim 2 is allowed. Claims 1, and 3-10 are rejected for reasons below. Since new grounds of rejection are applied in this office action that are not necessitated by applicants' amendment, this office action is made non-final.

Claim Objections

2. Claim 10 is objected to because of the following informalities: In claim 10, the word "evaporatable" is not in the dictionary. It is suggested to the applicants to replace this word with the phrase "that can be evaporated".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, and 3-10 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Gozdz et al. (US 5,429,891).

The product-by-process limitation “obtained by introducing the monomers simultaneously all at once into a polymerization vessel and then polymerizing the monomers” is not given patentable weight in product claim 3.

The product-by-process limitation “wherein the vinylidene fluoride copolymer is crosslinked in the presence of (1) a crosslinking agent selected from the group consisting of polyamines, polyols and polymerizable crosslinking agents having an unsaturated bond, and (2) a radical generating agent” in claim 7 is not given patentable weight.

The product-by-process limitation “formed from a mixture of the vinylidene fluoride copolymer, the nonaqueous electrolytic solution and an evaporatable solvent, by evaporating the evaporatable solvent from the mixture” in claim 10 is not given patentable weight.

The product-by-process limitations of claims 3, 7, and 10 are not given patentable weight since the courts have held that patentability is based on a product itself, even if the prior art product is made by a different process (see In re Thorpe, 227 USPQ 964, (CAFC 1985), In re Brown, 173 USPQ 685 (CCPA 1972), and In re Marosi, 218 USPQ 289, 292-293 (CAFC 1983)).

Gozdz et al. ('891) disclose a nonaqueous battery comprising a positive electrode comprising a positive electrode material capable of doping and dedoping (liberating) lithium, a negative electrode comprising a negative electrode material capable of doping and dedoping

(liberating) lithium, and a polymer electrolyte between the positive electrode and the negative electrode (col. 1, lines 15-20 and lines 64-65).

The polymer for the polymer electrolyte can be a copolymer of vinylidene fluoride and hexafluoropropylene with about 8 to about 25% hexafluoropropylene by weight and with about 75 to about 92 wt % being vinylidene fluoride and the copolymer can retain about 40 to about 60 % of the electrolytic solution (col. 6, lines 31-40).

The copolymer of vinylidene fluoride and hexafluoropropylene can be crosslinked in the presence of an acrylate ester, a di- or triallyl ester, and a di- or triglycidyl ether (col. 3, lines 40-55) and electron beam radiation (col. 5, lines 20-25).

The vinylidene fluoride/hexafluoropropylene copolymer preferably has a molecular weight which ranges from about 100×10^3 to about 500×10^3 (col. 5, lines 44-49).

In the amendment filed on 4/30/2002, applicants state on page 5 that the claimed inherent viscosity of greater than or equal to 1.7 dl/g roughly corresponds to $M_w \geq 500,000$. Therefore, a vinylidene fluoride/hexafluoropropylene copolymer having molecular weight of about 500×10^3 inherently has a viscosity of about 1.7 dl/g.

Since the weight ratio of vinylidene fluoride and hexafluoropropylene used in the copolymer and the inherent viscosity of the copolymer of Gozdz et al. ('891) fall within the ranges claimed by applicants for a copolymer of vinylidene fluoride and a monomer polymerizable with vinylidene fluoride (that is, 80 to 97 wt% vinylidene fluoride and 3 to 20 weight% of at least one monomer copolymerizable with vinylidene fluoride) and no polymerization process is perfect, the properties cited in the instant claims of abnormal linkage content of at least 3% at vinylidene fluoride sites are inherent in the copolymer.

When the Examiner has reason to believe that functional language (abnormal linkage content of at least 3% at vinylidene fluoride sites and an inherent viscosity of 1.7 dl/g) asserted to be critical for establishing novelty in claimed subject matter may, in fact be an inherent characteristic of the prior art as discussed above, the burden of proof is shifted to the applicant to prove that the subject matter shown in the prior art does not possess the characteristics relied upon. In re Fitzgerald et al. 205 USPQ 594.

5. Claims 1 and 3-10 are rejected under U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over WO 97/18596 (Equivalent document US 6,284,412 B1 relied upon for translation).

The product-by-process limitation "obtained by introducing the monomers simultaneously all at once into a polymerization vessel and then polymerizing the monomers" is not given patentable weight in product claim 3.

The product-by-process limitation "wherein the vinylidene fluoride copolymer is crosslinked in the presence of (1) a crosslinking agent selected from the group consisting of polyamines, polyols and polymerizable crosslinking agents having an unsaturated bond, and (2) a radical generating agent" in claim 7 is not given patentable weight.

The product-by-process limitation "formed from a mixture of the vinylidene fluoride copolymer, the nonaqueous electrolytic solution and an evaporatable solvent, by evaporating the evaporatable solvent from the mixture" in claim 10 is not given patentable weight.

The product-by-process limitations of claims 3, 7, and 10 are not given patentable weight since the courts have held that patentability is based on a product itself, even if the prior art product is made by a different process (see In re Thorpe, 227 USPQ 964, (CAFC 1985), In re Brown, 173 USPQ 685 (CCPA 1972), and In re Marosi, 218 USPQ 289, 292-293 (CAFC 1983)).

WO 97/18596 discloses a nonaqueous battery comprising a positive electrode comprising a positive electrode active material LiCoO_2 that is capable of being doped with and liberating lithium (col. 29, lines 63-67 of US 6,284,412 B1) and a negative electrode made of coke which is capable of being doped with and liberating lithium (col. 30, lines 7-14 of US 6,284,412 B1); and a polymer electrolyte between the positive electrode and the negative electrode (col. 25, lines 25-30 and col. 30, lines 15-29 of US 6,284,412 B1).

WO 97/18596 discloses that the polymer electrolyte can be a copolymer of vinylidene fluoride and hexafluoropropylene with hexafluoropropylene being 5 % wt in the copolymer and the copolymer can be crosslinked by an electron beam (col. 26, lines 55-65 of US 6,284,412 B1). The amount of nonaqueous electrolyte solution in the polymer electrolyte is 85 % by weight (col. 27, lines 40-45 of US 6,284,412 B1). The copolymer can also be crosslinked by radiation such as an electron beam or by a radical initiator (col. 15, lines 45-55 of US 6,284,412 B1). The copolymer of vinylidene fluoride preferably has a molecular weight of 1,000-10,000,000, preferably from 5,000 to 2,000,000, and more preferably from 10,000 to 1,000,000 (col. 14, lines 23-28 of US 6,284,412 B1).

In the amendment filed on 4/30/2002, applicants state on page 5 that the claimed inherent viscosity of greater than or equal to 1.7 dL/g roughly corresponds to $M_w \geq 500,000$.

Furthermore, the Figure C of the amendment shows that the relationship between the intrinsic viscosity and the molecular weight (average molecular weight) of the copolymer of vinylidene fluoride and hexafluoropropylene can be expressed by the equation $y = 34.851 \times -9.2093$. The values of 1,000-10,000,000 average molecular weight would correspond to 0.0029 dl/g to 28.7 dl/g according to applicants' equation in Figure C of the amendment which overlaps with applicants' claimed range of 1.7 dl/g to 7 dl/g.

Since the weight ratio of vinylidene fluoride and hexafluoropropylene used in the copolymer and the inherent viscosity of the copolymer fall within the ranges claimed by applicants for a copolymer of vinylidene fluoride and a monomer polymerizable with vinylidene fluoride (that is, 80 to 97 wt% vinylidene fluoride and 3 to 20 weight% of at least one monomer copolymerizable with vinylidene fluoride) and no polymerization process is perfect, the properties cited in the instant claims of abnormal linkage content of at least 3% at vinylidene fluoride sites and inherent viscosity having the claimed range are inherent in the copolymer of WO 97/18596.

When the Examiner has reason to believe that functional language (in this instance, the inherent properties of viscosity of 0.0029 dl/g to 28.7 dl/g and an abnormal linkage content of at least 3% at vinylidene fluoride sites) asserted to be critical for establishing novelty in claimed subject matter may, in fact be an inherent characteristic of the prior art as discussed above, the burden of proof is shifted to the applicant to prove that the subject matter shown in the prior art does not possess the characteristics relied upon. In re Fitzgerald et al. 205 USPQ 594.

Response to Arguments

6. Applicant's arguments with respect to claims 1, and 3-9 rejected under 35 USC 102/103 based on WO 98/38687 are withdrawn in view of applicants' submission of the certified translation of the priority document which supports the subject matter of instant claims 1 and 3-9.

Applicant's arguments with respect to claims 1, and 3-9 rejected under 35 USC 102/103 based on WO 97/18596 (Equivalent document US 6,284,412 B1 relied upon for translation) has been addressed in the response to amendment section above.

Allowable Subject Matter

7. Claim 2 is allowed.

8. The following is a statement of reasons for the indication of allowable subject matter:

The present invention claims a polymer electrolyte comprising a vinylidene fluoride copolymer and a nonaqueous electrolytic solution and the vinylidene fluoride copolymer comprises 80 to 97 wt% of vinylidene fluoride monomer units and 3 to 20 wt % of a mixture of hexafluoropropylene monomer and trifluorochloroethylene monomer and the copolymer has an inherent viscosity of 1.5 to 10 dl/g (applies to claim 2).

The closest prior art of record, Gozdz et al. (US Pat. No. 5,571,634) disclose a nonaqueous battery comprising a polymer electrolyte comprising a copolymer of vinylidene fluoride and chlorotrifluoroethylene where the chlorotrifluoroethylene is present about 8 to 20% by weight (col. 6, lines 29-35) but does not disclose, teach, or suggest a polymer electrolyte

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comprising a copolymer of vinylidene fluoride, chlorotrifluoroethylene and hexafluoropropylene where the total amount of chlorotrifluoroethylene and hexafluoropropylene in the copolymer is 3 to 20% by weight of the copolymer and the copolymer has an inherent viscosity of 1.5 to 10 dl/g

The closest prior art of record, EP 793286 discloses a terpolymer of vinylidene fluoride, hexafluoropropylene, and trichlorofluoroethylene (see page 2) but does not disclose, teach or suggest that the terpolymer has an inherent viscosity of 1.5 to 10 dl/g.

Conclusion

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Thursday from 9:30 AM to 8:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.

The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9310 for regular communications and (703) 872-9311 for After-Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/2 May 2003

Susy Tsang Foster